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To  
Subject Technical Memo - Sand Test

Nabil;

Attached is a draft Technical Memo setting out our understanding of the Rossum test requested by the agency. Please advise if you have suggested changes or if the program is approved for implementation.

Any questions, please call.

Steve

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SR012105 Sand Pumping Tech Memo 1.doc

**Sauget Area 2 Groundwater Migration Control System**  
**Groundwater Extraction Wells**  
**Sand Pumping Tests**  
**January 24, 2005**

**TECH MEMO**

**Objective** The following testing program for the Sauget 2 Groundwater Migration Control System will be implemented to determine the amount of sand entering each well when the pumping rate changes (high energy condition with increase in groundwater velocities entering the well screen), and when the pumping rate is constant (steady state condition).

**Data Collection** - To determine the effect of pumping rate on sand production, pumping rates will be increased in steps of 20, 40, 60, 80 and 100 percent of total well flow. Total system capacity, with three wells running at full flow, is approximately 2200 gpm or slightly more than 700 gpm per extraction well. Maximum well capacity, i.e. 100 percent of total well flow, will be set at 700 gpm for each well during performance of these step tests. Each extraction wells will be tested individually with the other two extraction wells turned off to ensure that pumping from the other wells does not influence the results obtained from the test well.

Pumping rates, test duration and cumulative discharge are listed below:

<u>Percent of Total Flow (Percent)</u>	<u>Flow Rate (GPM)</u>	<u>Step Duration * (Hours)</u>	<u>Cumulative Duration (Hours)</u>	<u>Cumulative Discharge (Gallons)</u>
20	140	24	24	201,600
40	280	24	48	403,200
60	420	24	72	604,800
80	560	24	96	806,400
100	700	24	120	<u>1,008,000</u>

**Total Discharge 3,024,000 gallons**

Groundwater levels will be measured in the pumping well, the two non-pumping extraction wells, piezometers PZ-1 I and O, PZ-2 I and O, PZ-3 I and O and PZ-4 I and O and existing wells B-21, B-25B, B-26B, B-28B and B-29B.

Two Rossum Sand Content Testers will be installed on the sampling port of the pumping well to measure the sand content of the pumped groundwater. One sampler will be used during the early-time, rapid drawdown, high energy period and the other sampler will be used during the late-time, steady-state, lower energy time period. A "T" will be attached to the 3/4-inch sampling port line and a Rossum sampler will be installed at each end of the "T" and isolated from the sampling port by a valve. During early-time (rapid) drawdown, the valve leading to one of the Rossum samplers will be open and the other valve will be closed. At the end of the early-time drawdown period, the open valve will be closed to isolate the Rossum sampler used during the early-time portion of the test. and the valve to the late-time drawdown sampler will be opened. At the end of the 24 hour step test period the early-time and late-time sand accumulations will be measured, the sample tubes will be emptied, cleaned and replaced and the pumping rate will be increased to the next step-text increment. If the late-time drawdown Rossum

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Sampler fills up, discharge will be switched to the early-time drawdown sampler which will be measured, emptied and cleaned prior to its use during the late-time drawdown period. Discharge water from the sampler will be routed back to the pumping well, or as an alternate, to the American Bottoms Wastewater Treatment Plant.

Sand content will be determined using the following equation (Roscoe Moss Company, [www.roscoemoss.com/rossumd](http://www.roscoemoss.com/rossumd)):

$$\text{Sand Content (ppm)} = \text{Sand Accumulation (ml)} \times 528.3 / \text{Sample Time (minutes)}$$

**Data Interpretation -**

Once the data is collected, it will be submitted to USEPA for review and a conference call will be scheduled to discuss data interpretation methods.